

CH-47F Improved Cargo Helicopter (ICH)

The Army is remanufacturing the CH-47D Chinook, equipped with the new T55-GA-714A engines, into the CH-47F Improved Cargo Helicopter (ICH). Through this service life extension program, the Army intends to sustain the aging CH-47D airframe and extend the aircraft's life expectancy another 20 years. The CH-47D is a twin-turbine tandem rotor helicopter that conducts combat and combat support heavy-lift cargo missions. ICH improvements include fuselage stiffening (to reduce vibrations in the cockpit area), an integrated cockpit, and digital communications for Objective Force compatibility. The prime contractor, Boeing, will rebuild 300 systems.

OSD's approval for entry into the engineering and manufacturing development (EMD) phase came in FY98 on perceived low-technical risk, and delegated Milestone decision authority to the Army Acquisition Executive. The program has experienced delays, changes to the Operational Requirements Document (ORD), cost overruns resulting in a Nunn-McCurdy breach, and significant program restructuring in FY02. The Army Acquisition Executive's approval for the purchase of up to 30 low-rate initial production aircraft occurred on August 19, 2002. The Army plans to conduct the IOT&E commencing on April 5, 2004, with the full-rate production decision occurring in early FY05.

A December 12, 2002, Program Decision Memorandum gave priority for production to the MH-47G (Special Operations Forces) over the CH-47F ICH. Significant differences between the two helicopters require a reconfiguration of the production line after the first CH-47F is complete and rolls off the line. Consequently, the Army will procure five fewer CH-47Fs to offset the production cost increase and postpone the fielding of the first unit of CH-47F aircraft until FY07.

The Army Requirements Oversight Council approved changes made to the ORD and forwarded the document to the Joint Requirements Oversight Council (JROC) for review and approval. The Army expects JROC's approval in early FY04.

DOT&E approved an alternative LFT&E plan after concurring with the Army's request for a waiver from full-up system-level testing in December 1997. The Under Secretary of Defense, Acquisition and Technology provided the waiver certification to Congress in March 1998. DOT&E approved the Army's LFT&E strategy in January 1999. A repaired CH-47D production aircraft was functioning as a live fire ground test vehicle until an accident following a maintenance action damaged it as a test article. LFT&E began in 2QFY99.

TEST & EVALUATION ACTIVITY

Following 158 flight hours of developmental flight-testing, the first EMD aircraft began the reliability and maintainability (R&M) flight-testing phase on January 7, 2003, with the second EMD aircraft first flight occurring on April 15, 2003. Together, the EMD aircraft will complete over 550 flight hours during this R&M phase by the end of 2003. The Army plans to fly an additional 90 flight hours during the IOT&E. During the past year, flying the aircraft from Fort Worth, Texas, to Phoenix, Arizona, to El Centro, California, and to Jupiter, Florida, not only attests to the aircraft's ability to self deploy, but provides the Army an opportunity to conduct and assess operational missions in desert, high-altitude, and tropic conditions. DOT&E and Army concerns involving the possibility of a migration or increase of vibration levels in the aft section of the aircraft prompted the conduct of a vibration/strain comparison test between the CH-47D and the CH-47F model. The Army anticipates the results and analysis of this testing during the 2QFY04.

The LFT&E program includes a vulnerability assessment by the U.S. Army Research Laboratory (ARL). ARL is completing their initial vulnerability analyses for the baseline CH-47D and the CH-47F



The CH-47F Improved Cargo Helicopter Upgrade performing an external lift demonstration.

ARMY PROGRAMS

ICH using ARL-developed modeling tools in conjunction with detailed aircraft descriptions. The live fire test includes cockpit skin panels, cockpit components, fuel subsystem, propulsion system engine nacelle fire suppression system, and will test the fuselage tunnel flight control systems. The vulnerability assessment is in continual update which will result in a comparative analysis to assess the vulnerability of the CH-47F ICH relative to the CH-47D.

ARL completed ballistic testing of the cockpit skin panels, cockpit components, and the T55 engine and fuel subsystem. Damage to the test vehicle requires alternate test plans for testing of the fire suppression system and of the fuselage tunnel. Testing of the fuselage tunnel flight controls system will take place during 1QFY04. As a result of losing the test vehicle, ARL's plan to conduct static and dynamic ballistic tests of the CH-47D rotor blades as part of the DOT&E Joint Live Fire Program during FY03 has been interrupted with only static testing having been completed (analysis of the results pending). Since these blades are the same as those to be used on the CH-47F model, the data derived from the Joint Live Fire Program is directly applicable to the LFT&E of the CH-47F.

OSD approved the Test and Evaluation Master Plan (TEMP) in January 2002. A TEMP update is being staffed and will receive approval early in FY04. ORD, programmatic, and schedule changes are driving the need for an update to the TEMP.

TEST & EVALUATION ASSESSMENT

To date, overall operational and system effectiveness are good. However, program goals for system reliability, vibration reduction, and digital interoperability may not be achieved.

Even though reliability testing to date confirms that failures in the CH-47F are common to legacy CH-47D aircraft, these same testing results suggest that the CH-47F is at low to moderate risk to achieve ORD R&M thresholds.

Fatigue damage on the CH-47F aircraft is similar to damage found in legacy aircraft. However, higher vibration levels at the combiner cooling fan location raise concerns within the test community about the long-term reliability of aircraft components and the potential long-term impact on overall structure damage.

Testing on the CH-47F demonstrates the system's capability to send and receive selected digital messages between aircraft and a ground-based Force XXI Battle Command, Brigade and Below simulator. IOT&E will provide the opportunity to demonstrate aircraft-to-aircraft digital messaging, compatibility with Joint and Army technical architecture, and interoperability with a fully loaded tactical internet.

Test data from the Army's live fire test of the CH-47F and the DOT&E Joint Live Fire Program of the basic CH-47D will support an adequate evaluation of the CH-47F. The only LFT&E concern is that accidental damage done to the ground test vehicle may preclude dynamic testing of the fire suppression system, fuselage tunnel flight controls system, and the main rotor blades.